



The Sixth Asia/Oceania Meteorological Satellite Users' Conference 9 – 13 November 2015, Tokyo/Japan



Introducing a Web-based System for Hyperspectral Instrument Status and Data Quality Assessment to Meteorological Users

Xin Jin, Ninghai Sun, Fuzhong Weng
NOAA/NESDIS/STAR





Outlines

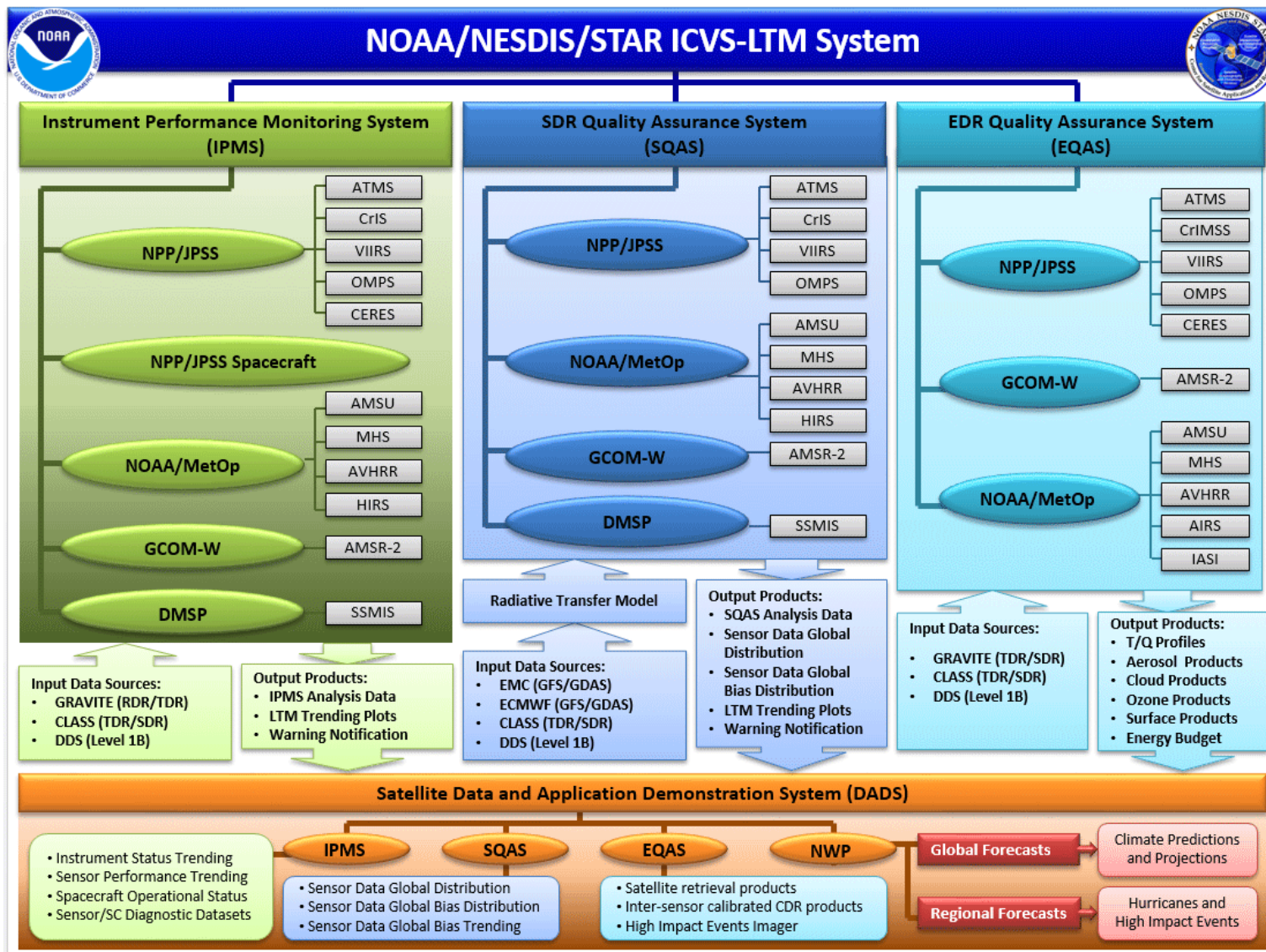


1. An introduction to the NOAA Integrated Cal/Val System (ICVS)
 1. ICVS overview
 2. SNPP CrIS
 3. ICVS-CrIS

2. Application of ICVS-CrIS in support of NOAA operations
 1. Impulse noise
 2. Lunar intrusion
 3. Ground system performance
 4. Data indexing and querying
 5. Spacecraft maneuver

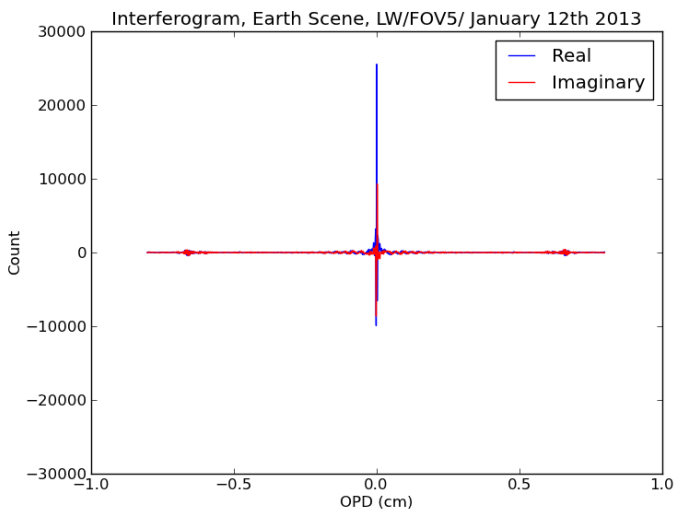
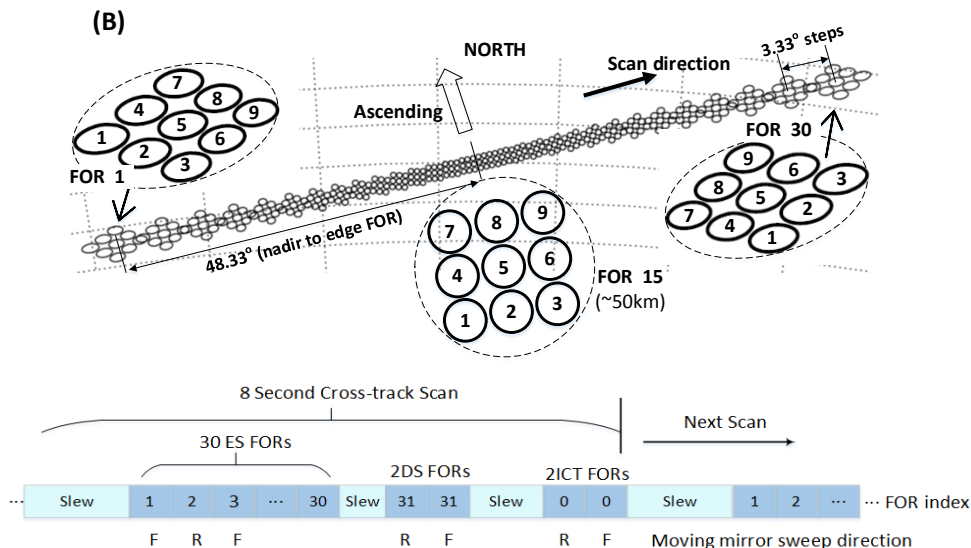
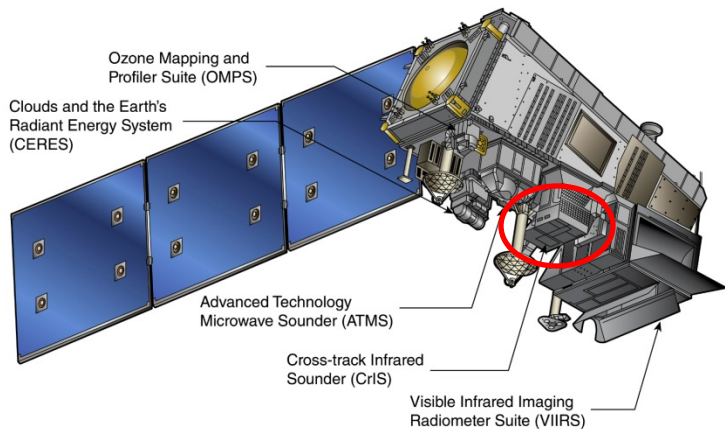
3. Conclusions and future plans

NOAA Integrated Cal/Val System (ICVS)

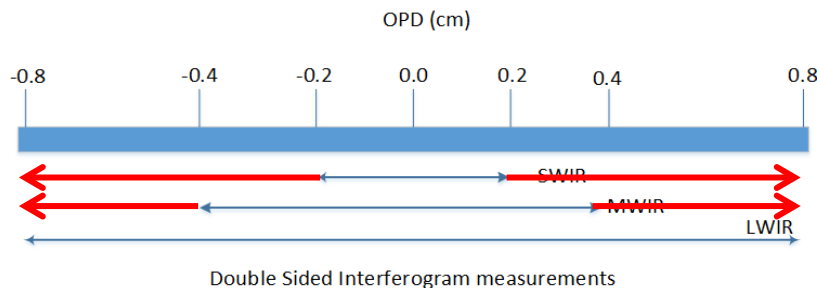


SNPP Cross-track Infrared Sounder (CrIS)

the first NOAA operational hyperspectral infrared sounder

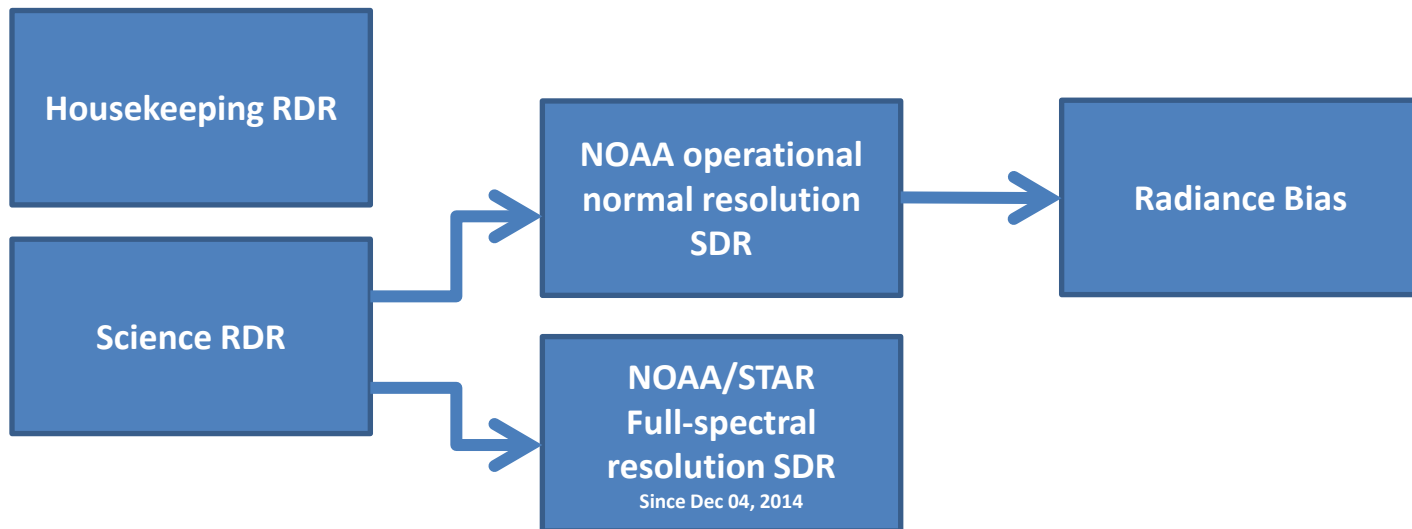


Frequency Band	Spectral range (um)	Effective OPD (cm)	Spectral resolution (wavenumber)	Number of bins in the interferogram
LWIR	9.14 - 15.38	0.80352	0.625	866
MWIR	5.71 - 8.26	0.4092 (0.81375)	1.25 (0.625)	530 (1052)
SWIR	3.92 - 4.64	0.2015 (0.8029775)	2.5 (0.625)	202 (799)



Interferograms per day: $9,914,400 = 3(\text{bands}) * 9(\text{FOVs}) * 34(\text{FORs}) * 10800(\text{scans})$

- Five related modules



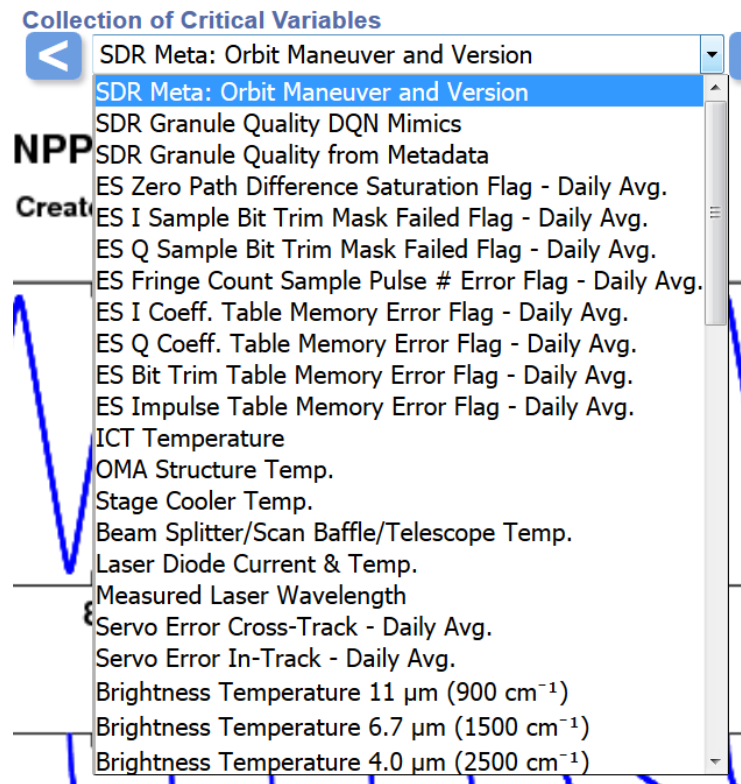
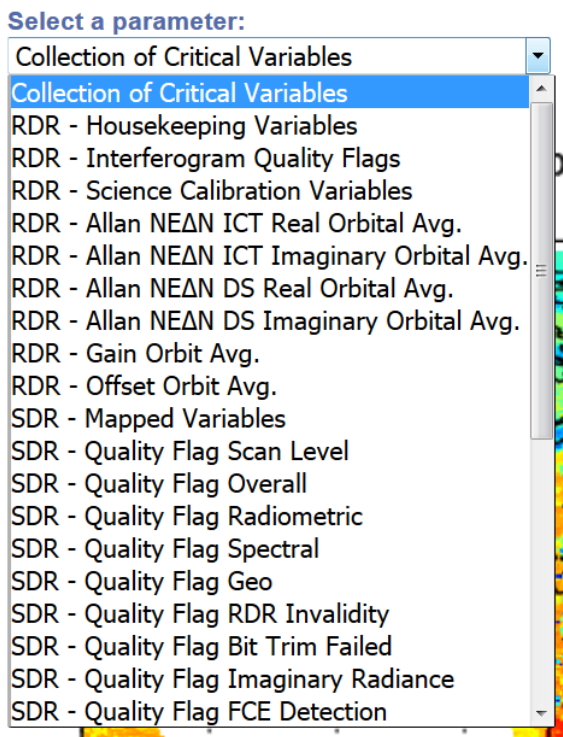
- Full-stack coverage of SNPP CrIS Cal/Val history, ongoing instrument status, and ground system anomalies
 - Intact records of figures and processing logs since the beginning of the mission
 - All the data on the plots are saved for further analysis
 - Anomaly events are archived as JSON files.
- Supporting both SNPP and JPSS-1 CrIS missions

ICVS-CrIS (continued)

- 1) Go to www.star.nesdis.noaa.gov/icvs/status_NPP_CrIS.php, or Google 'noaa icvs'
- 2) Select 'CrIS' or 'CrIS FSR' from the left navigation panel
- 3) Select a group of parameters from the first draw-down box
- 4) Select a parameter from the middle drawdown box
- 5) Select the date from the calendar

The screenshot shows the STAR ICVS Long-Term Monitoring website. The URL in the browser is www.star.nesdis.noaa.gov/1vs/status_NPP_CrIS.php. The page title is "STAR ICVS Long-Term Monitoring" with the subtitle "Integrated Calibration / Validation System Long-Term Monitoring". The main content area displays the instrument status for the NPP CrIS instrument on 10/10/2015 at 00:10 ET / 04:10 UTC. The page is showing the last 24 hours of instrument status, updated every three hours. The main display area shows a global map of NPP CrIS Brightness Temperature, 11 μm (900 cm⁻¹), Mapped, Ascending, 10/09/2015. The map is updated on Oct 10 01:55:49 2015 UTC. The map shows a color-coded temperature distribution over the globe, with a color scale from blue (colder) to red (warmer). The map is labeled with latitude and longitude coordinates. Below the main map, there is a second map showing the NPP CrIS Brightness Temperature, 11 μm (900 cm⁻¹), Mapped, Descending, 10/09/2015. The left navigation panel includes sections for "STAR ICVS Home", "Operational Notices", "Instrument Performance Monitoring", "Suomi NPP", "MetOp-B", "MetOp-A", "NOAA-19", "NOAA-18", "NOAA-15", and "GOES". The "Suomi NPP" section is expanded, showing "CrIS >>" selected. The "Select a parameter:" dropdown menu is set to "SDR - Mapped Variables". The "Select a Date:" dropdown menu is set to "10-09-2015".

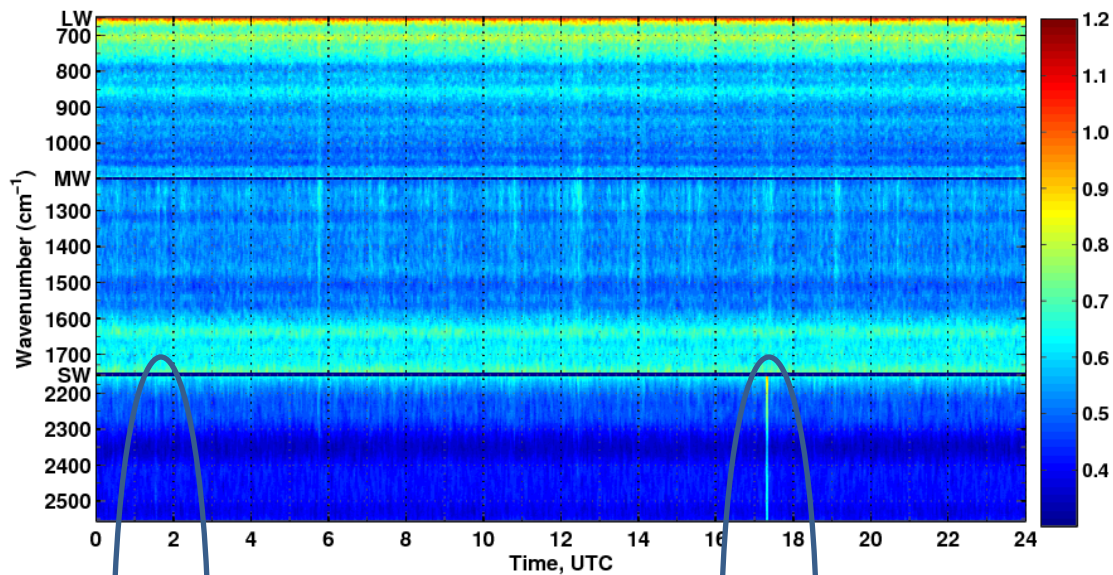
- A closer look



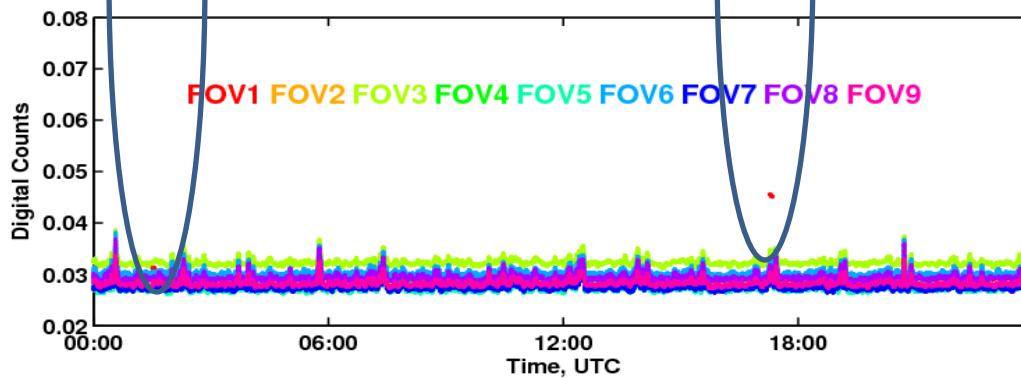
1. Figures in 'Collection of Critical Variables' can be found in other groups. They are my most frequently examined parameters on a daily basis
2. Instrument linearity features are calculated using Allan variance for each orbit
3. 'SDR - Quality Flag ***' include quality flag of each pixel, together with daily averaged statistics

Application: impulse noise

Normalized FOV1 NEDN, Reverse direction, Oct-06-2015

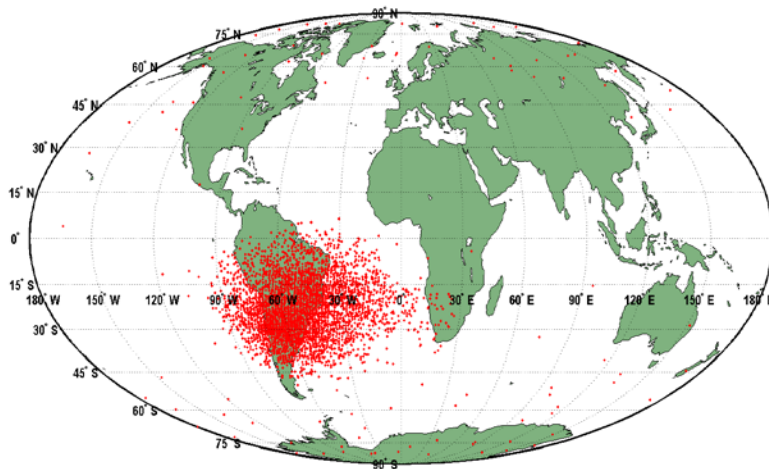


SW Internal Calibration Target Spectral Stability, Oct-06-2015

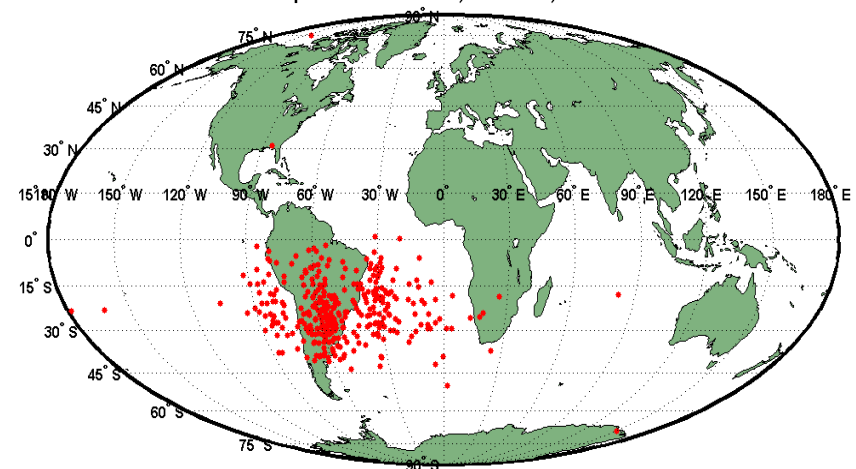


Application: impulse noise

Impulse: Deep Space Scene

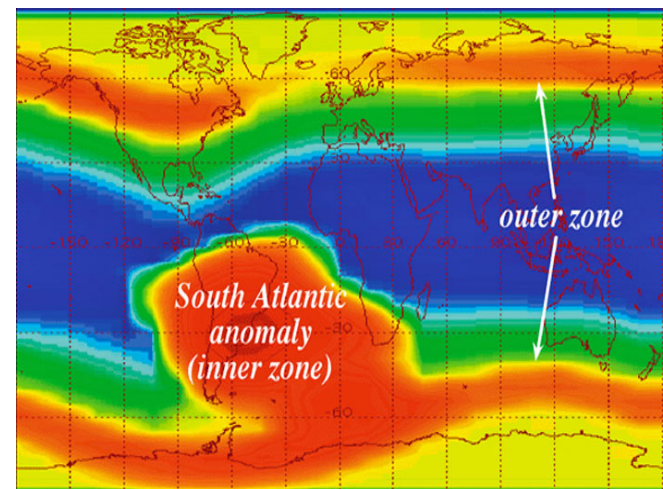
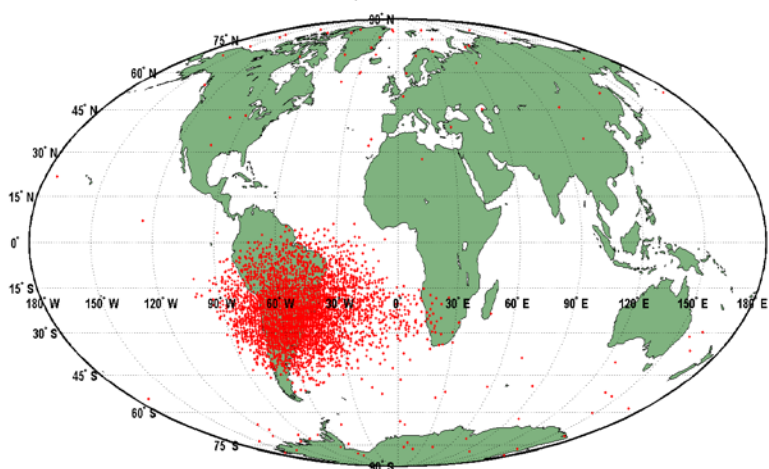


SNPP CrIS SW Impulse: Earth Scene; 20150930, Number of event: 342



Impulse events on (upper) Cold and (lower) hot calibration targets between Jan 01 and May 31, 2015

Impulse: ICT Scene



http://www.bibliotecapleyades.net/ciencia/ciencia_earthchanges49.htm

Application: impulse noise

STAR ICVS Integrated Calibration / Validation System
Long-Term Monitoring
Monitoring and characterizing satellite instrument performance in orbit for weather, climate and environmental applications

Search

STAR ICVS Long-Term Monitoring [About the Suomi NPP CrIS instrument](#)

Displaying the last 24 hours of instrument status, updated every three hours.

10/10/2015 12:13 ET / 16:13 UTC **Instrument Status > NPP > CrIS-FSR**

Select a parameter: NOAA/STAR Calibration
NOAA/STAR Calibration
SDR - Quality Flag Radiometric
SDR - Quality Flag Spectral
SDR - Quality Flag Geo
SDR - Quality Flag RDR Invalidation
SDR - Quality Flag Bit Trim Failed
SDR - Quality Flag Imaginary Radiance
SDR - Quality Flag FCE Detection
SDR - Quality Flag FCE Correction
SDR - Quality Flag Lunar Intrusion
SDR - Quality Flag Day/Night
SDR - Moving Window Size
SDR - Moving Window Spectral Stability
SDR - RDR Impulse Noise Count
SDR - SDR Fringe Count
SDR - ES ZPD Fringe Count
SDR - ES ZPD Amplitude
SDR - ES Spectral Radiance & RT
SDR - Other Variables
NOAA/STAR Calibration Processing log

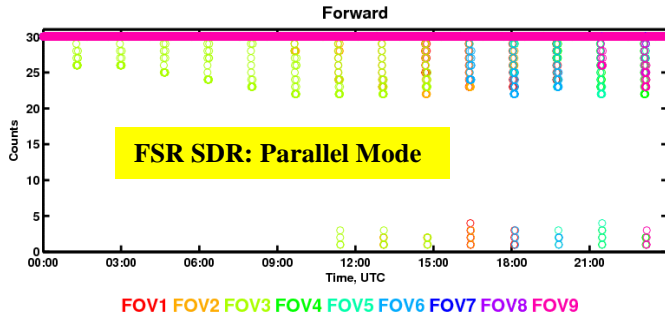
Select a Date: 10-06-2015

Earth Scene SW impulse event 3

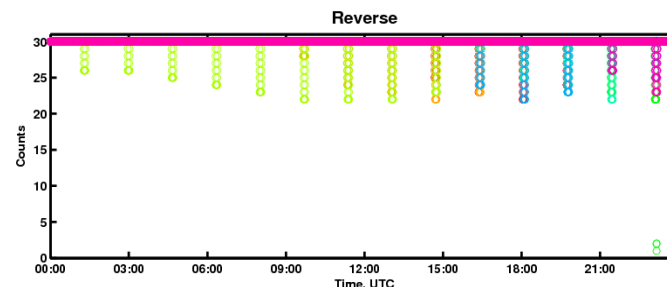
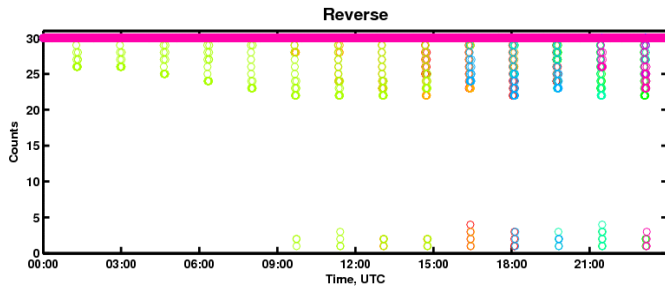
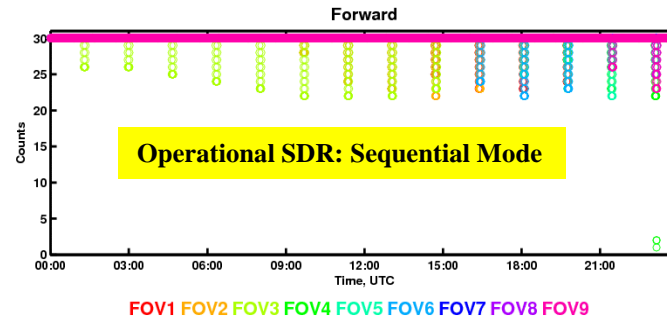
CrIS SW Impulse: Earth Scene; 20151006, Number of event: 263

Application: lunar intrusion bug

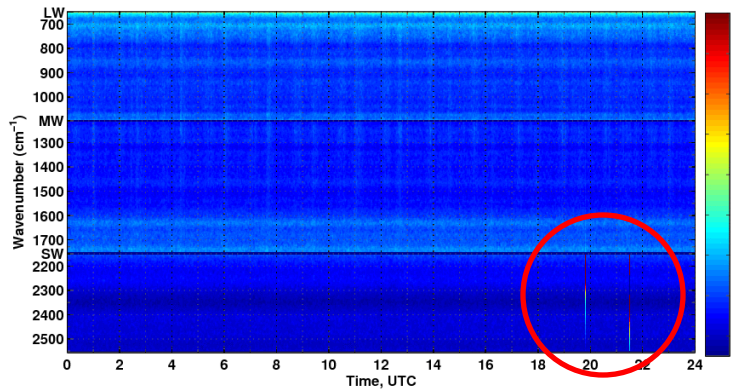
NPP CrIS FSR DS Moving Window Size, Short Wave 06/26/2015
Created at 06/28/2015 - 19:56:41 UTC



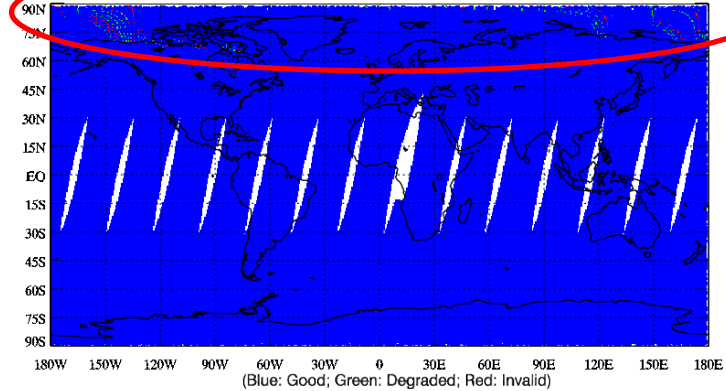
Deep Space Moving Window Size, Short Wave: 06/26/2015
Created at 06/27/2015 - 10:59:33 UTC



FOV5 NEDN, Reverse direction, Jun-26-2015



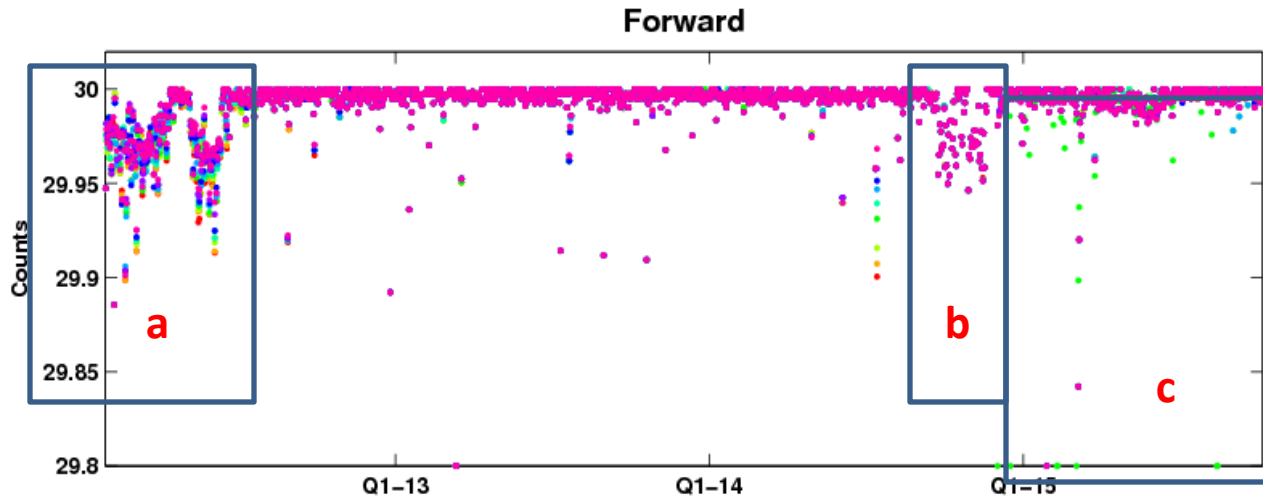
NPP CrIS FSR SW SDR Overall Quality Flag, Mapped, Descending, 06/26/2015



Application: ground system performance

NPP CrIS ICT Moving Window Size, Short Wave, Daily Average

Created at 10/06/2015 – 20:12:15 UTC



FOV1 FOV2 FOV3 FOV4 FOV5 FOV6 FOV7 FOV8 FOV9

Calibration window size is a good indicator for ground processing system behavior, drop of calibration window size indicates the incompleteness of science RDR data:

- a) Minimal percentage of received RDR packets for processing is set too low
- b) Re-tasking procedure failed
- c) Contamination of Direct Broad (DB) data stream. Packets of FOV4 and 6 are dropped in DB data steam for data rate concern

Application: data indexing and querying

Search

- » STAR ICVS Home
- » Operational Notices
 - Notices Archive
- » Instrument Performance Monitoring
 - Suomi NPP
 - Spacecraft
 - **ATMS**
 - **CrIS >>**
 - CrIS FSR
 - VIIRS
 - OMPs Nadir Mapper
 - OMPs Nadir Profiler
 - OMPs Limb Profiler
 - MetOp-B
 - AMSU-A
 - MHS

STAR ICVS Long-Term Monitoring

Displaying the last 24 hours of instrument status, updated every three hours.

10/10/2015
12:24 ET / 16:24 UTC

[About the Suomi NPP CrIS Instrument](#)

Instrument Status > NPP > CrIS

Select a parameter: **Processing log** 2 Processing log Science RDR 3a Select a Date: 10-09-2015

```

*****
Processing starts at 2015-10-09 07:46:07
*****
0001 RCRIS-RNSCA_npp_d20151008_t2359482_e0000201_b20453_c20151009015544790335_noaa_ops.h5 00000 00001 00002
0002 RCRIS-RNSCA_npp_d20151009_t0000201_e0000521_b20453_c20151009015624181387_noaa_ops.h5 00004 00005 00006
0003 RCRIS-RNSCA_npp_d20151009_t0000521_e0001241_b20453_c20151009015643614800_noaa_ops.h5 00008 00009 00010
0004 RCRIS-RNSCA_npp_d20151009_t0001241_e0001561_b20453_c20151009015723019364_noaa_ops.h5 00012 00013 00014
0005 RCRIS-RNSCA_npp_d20151009_t0001561_e0002281_b20453_c20151009015742714565_noaa_ops.h5 00016 00017 00018
0006 RCRIS-RNSCA_npp_d20151009_t0002281_e0003001_b20453_c20151009015824493695_noaa_ops.h5 00020 00021 00022
0007 RCRIS-RNSCA_npp_d20151009_t0003001_e0003321_b20453_c20151009015903769551_noaa_ops.h5 00024 00025 00026
0008 RCRIS-RNSCA_npp_d20151009_t0003321_e0004041_b20453_c20151009015923882537_noaa_ops.h5 00028 00029 00030
0009 RCRIS-RNSCA_npp_d20151009_t0004041_e0004361_b20453_c20151009015959778867_noaa_ops.h5 00032 00033 00034
          
```

Search

- » STAR ICVS Home
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 - Notices Archive
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 - Suomi NPP
 - Spacecraft
 - ATMS
 - **CrIS >>**
 - CrIS FSR
 - VIIRS
 - OMPs Nadir Mapper
 - OMPs Nadir Profiler
 - OMPs Limb Profiler
 - MetOp-B
 - AMSU-A
 - MHS
 - NOAA-19
 - AMSU-A
 - MHS

STAR ICVS Long-Term Monitoring

Displaying the last 24 hours of instrument status, updated every three hours.

10/10/2015
12:24 ET / 16:24 UTC

[About the Suomi NPP CrIS Instrument](#)

Instrument Status > NPP > CrIS

Select a parameter: **Processing log** 3b Processing log IDPS SDR Select a Date: 10-09-2015

```

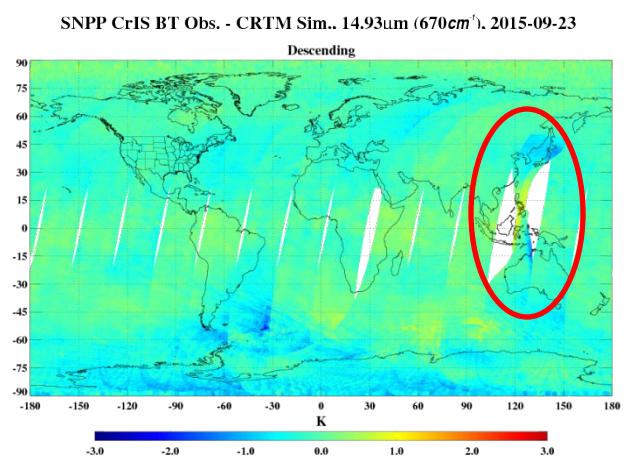
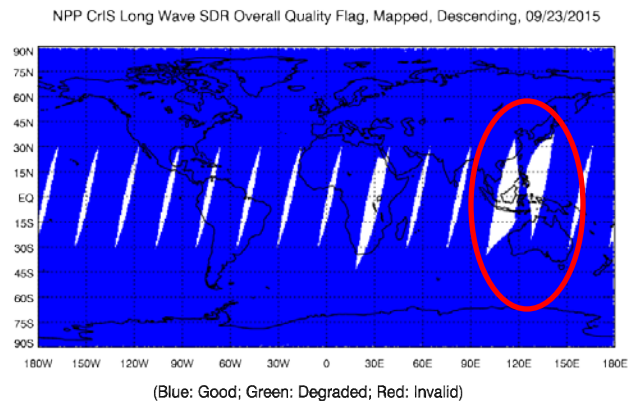
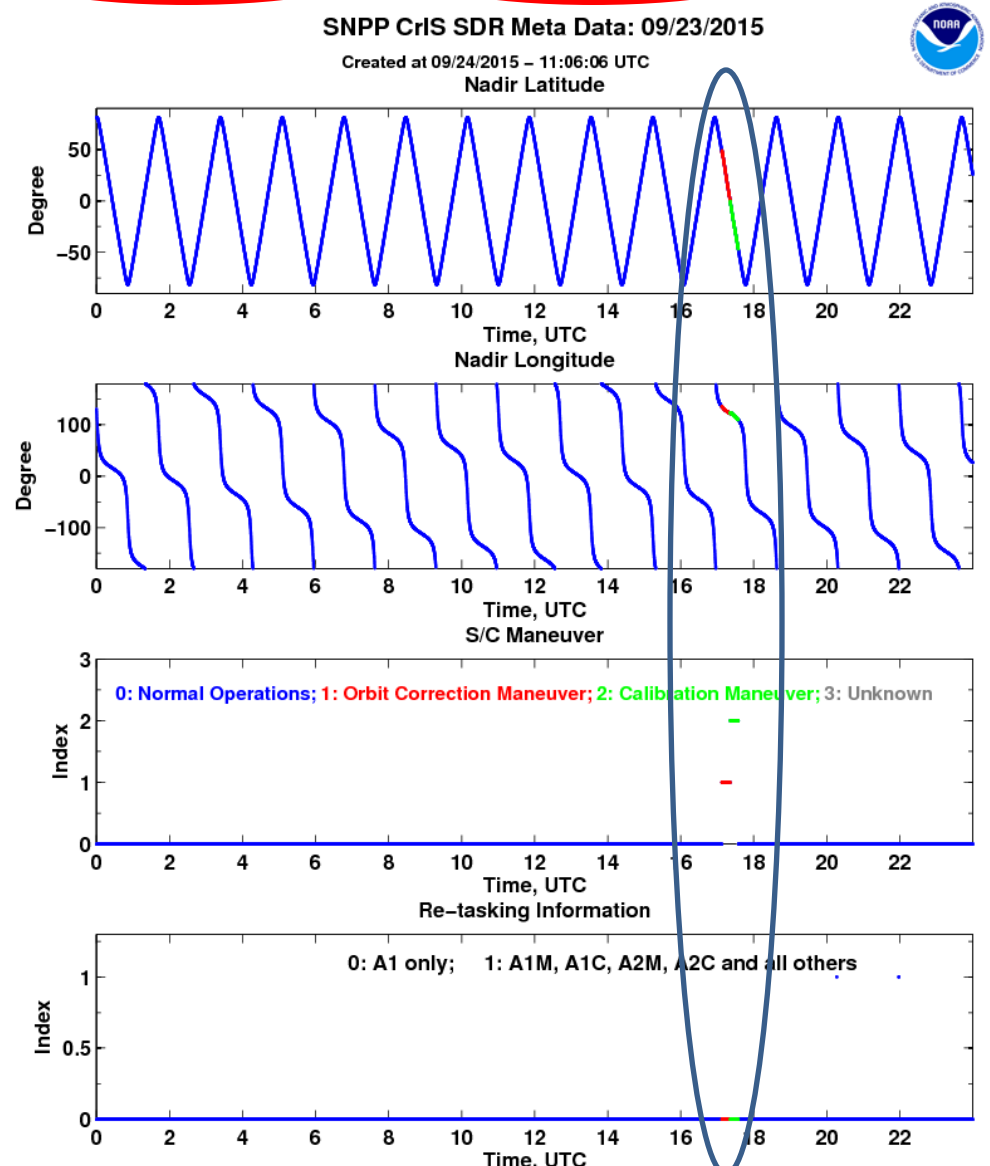
*****
Processing starts at 2015-10-09 07:09:04
*****
Processing granule files...
508 unique granules are collected
00001 /data/scdr004/DJacSfZzTLWmtitULe5YEg/GCRSO_npp_d20151008_t2359529_e0000227_b20453_c201510090637467149
00001 /data/scdr008/19nKJ0PsQ+ao9sL2OUcVA/SCRIS_npp_d20151008_t2359529_e0000227_b20453_c201510090645456708
1823 40031884153 18 discarded
scan 20151009_00001.mat 80.7732 128.2573
scan 20151009_00002.mat 80.8924 125.3625
scan 20151009_00003.mat 80.9886 122.3987
00001 /data/scdr001/pTN404ySuaR8+0J92258g/GCRSO_npp_d20151009_t0000249_e0000547_b20453_c201510090637467149
00001 /data/scdr003/BFpBtdfQcQUDdY4a4RdTg/SCRIS_npp_d20151009_t0000249_e0000547_b20453_c201510090645456708
scan 20151009_00004.mat 81.0611 119.3803
scan 20151009_00005.mat 81.1095 116.3218
scan 20151009_00006.mat 81.1332 113.2388
scan 20151009_00007.mat 81.1321 110.1482
00003 /data/scdr007/r40Ha3qUTfuQzBff1oqpgQ/GCRSO_npp_d20151009_t0000569_e0001267_b20453_c201510090637467149
          
```

[http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/\\${yyyy}/\\${mm}/\\${yyyymmdd}_rcris_icvs_log.txt](http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/${yyyy}/${mm}/${yyyymmdd}_rcris_icvs_log.txt)
[http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/\\${yyyy}/\\${mm}/\\${yyyymmdd}_scris_icvs_log.txt](http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/${yyyy}/${mm}/${yyyymmdd}_scris_icvs_log.txt)

Application: spacecraft maneuver

- Instrument Performance Monitoring
- Suomi NPP
 - Spacecraft
 - ATMS
 - CrIS >> 1**
 - CrIS FSR
 - Virr
 - OMPS Nadir Mapper
 - OMPS Nadir Profiler
 - OMPS Limb Profiler
 - MetOp-B
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
 - NOAA-19
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
 - MetOp-A
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
 - NOAA-18
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
 - NOAA-15
 - AMSU-A
 - GOES
 - GOES-13 Sounder
 - GOES-13 Imager
 - GOES-15 Sounder
 - GOES-15 Imager
 - OMPS Product Demonstration Site
- Data and images displayed on STAR sites are provided for experimental use only and are not official operational NOAA products. [More information>>](#)

Select a parameter: **2** Collection of Critical Variables
 SDR Meta: Orbit Maneuver **3** and Version
 Select a Date: 09-23-2015





Conclusions



- The ICVS-CrIS is a powerful tool for NOAA operational hyperspectral satellite data monitoring and quality analysis
- Users are encouraged to search useful information on its website for their own works.
- Your suggestions and feedbacks are greatly appreciated and are critical for us to make improvements in the future.